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MCU-AN-510044-E-10

FM3

32-BIT MICROCONTROLLER

MB9B610 Series

FSS MB9BF618S EV-BOARD

USER MANUAL

APPLICATION NOTE

For more information for the FM3 microcontroller, visit the web site at:
http://www.fujitsu.com/global/services/microelectronics/product/micom/roadmap/industrial/fm3/

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Revision History

Date	Author	Version	Remark
2012-05-28	FSS	V1.0	

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1 Introduction

1.1 Product Overview

FSS MB9BF618S Evaluation Board (PN: FSSDC-9B618-EVB, shown as below) provides an economical and simple means for the study of MB9BF610 series MCU (ARM cortex-M3 based). The board contains dual Ethernet ports and some external resources (LED, Key, USB Device, USB Host interface, NAND Flash and Micro SD) to demonstrate MCU periphery function.

It also provides standard 20 pin JTAG interface, which is compatible with both IAR and Keil debug tool. In addition, it allows on-board programming using USB mode.

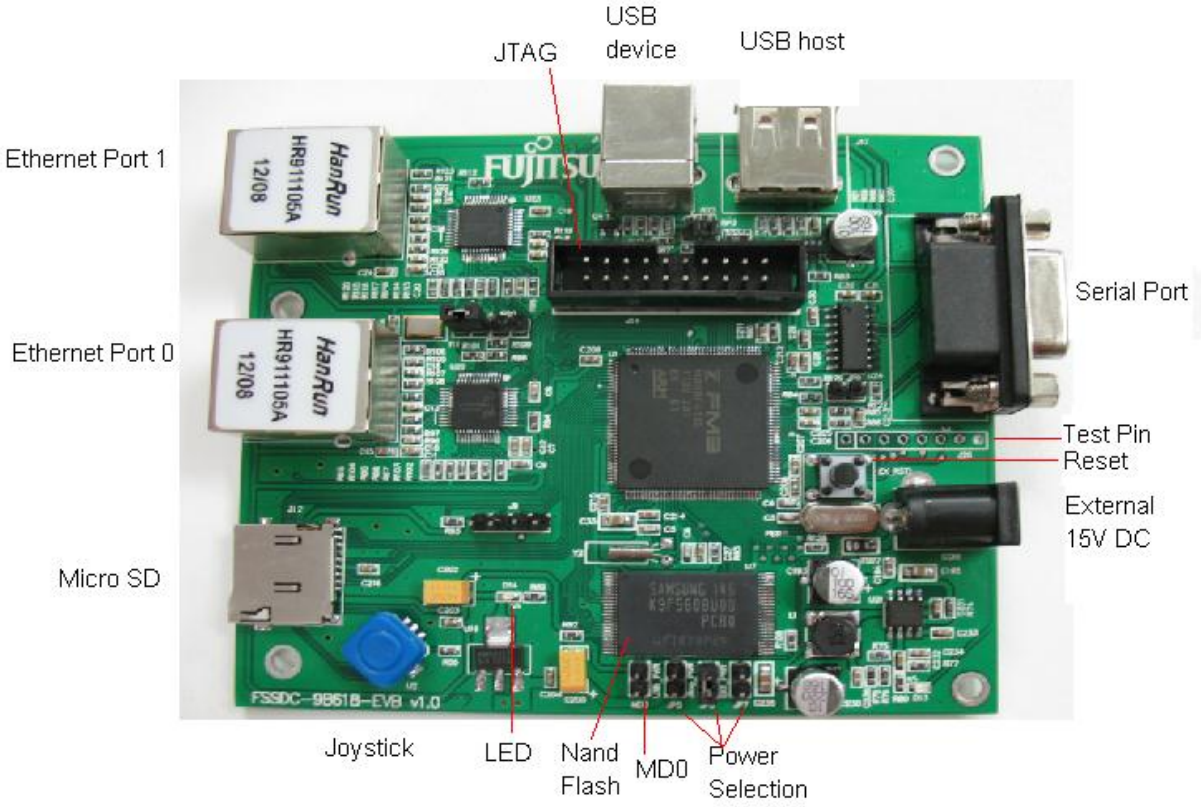

Figure 1-1: FSSDC-9B618-EVB Overview

1.2 MB9B610 Series MCU

MB9B610 series MCU is 32-bit general purpose MCU of FM3 family that features the industry's leading-edge ARM Cortex-M3 CPU and integrates Fujitsu's highly reliable and high-speed secure embedded flash technology. And up to 2 independent Ethernet MAC controllers are contained in the MCU. This MCU can operate at up to 144MHz CPU frequency and work at a wide voltage range (2.7V-5.5V), which can be compatible with both 3.3V and 5V system.

It includes a host of robust peripheral features, including motor control timers (MFT), base timer (can be configured to PWM, PPG, Reload, PWC timer), ADCs, on-chip memory (up to 1M bytes Flash, up to 128K bytes SRAM) and a wide range of communication interfaces (USB, I2C, SIO, LIN, CAN).

The size of on-chip memory varies with different part number and the package is available in LQFP and BGA, as shown in following table.

Product	Flash	SRAM	Package
MB9BF616S/T	512kB	64kB	S: LQFP: FPT-144P-M08 (0.5mm pitch) T: LQFP:FPT-176P-M07(0.5mm pitch) BGA: BGA-192P-M06 (0.8mm pitch)
MB9BF617S/T	784kB	96kB	
MB9BF618S/T	1MB	128kB	

Table 1-1: Product List

1.3 Board Features

FSSDC-9B618-EVB includes following features:

- Microcontroller MB9BF618S
- 2x Ethernet Ports
- 1x USB-Host (Type-A connector)
- 1x USB-Device (Type-B connector)
- 1x UART
- 1x LED (for user) ,1x LED (for power)
- 1x Joystick
- 1x ‘Reset’-button
- 1x Nand Flash（32MBytes）
- 1 xMicro SD slot (SPI)
- Standard JTAG Interface on a 20 pin-header
- Power supply via USB-Device, JTAG or external with 15V DC power

2 Getting Started

The microcontroller on the FSSDC-9B618-EVB has been programmed with a test program. Please follow the steps below firstly.

1) Make sure that both JP11 and JP5 are shorted, MD0 is disconnected. Connect the EVB with PC via USB cable (Type-B Connector) for power supply.

2) Observe blinking of the LED (Green), which shows that both the test program in the MCU and the power supply work well.

2.1 UART

- Connect the EVB with serial COM of PC (using extension cable). A USB-232 cable is the alternative if serial COM is not available for the PC.
- Run the serial tool on the PC and set its parameters. The configuration below is for super terminal of the Windows: 8-bits data, 1 stop bit, no parity, 115200 bps baudrate.

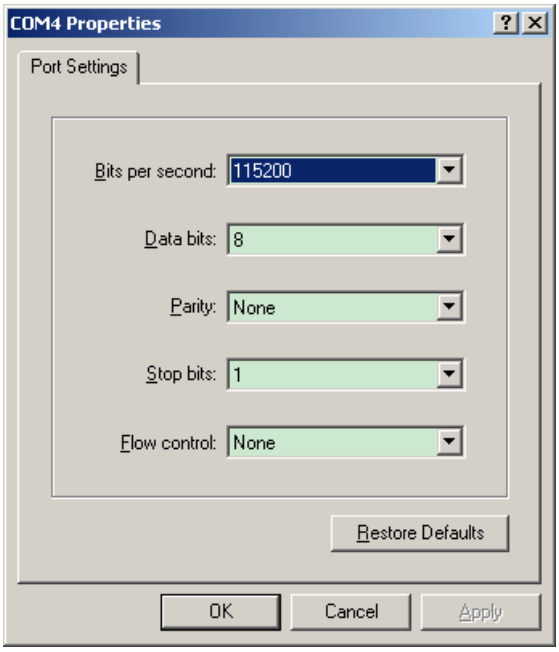

Figure 2-1: Configuration of serial communication

- The message below will be shown in the serial debug tool after the EVB is powered on.

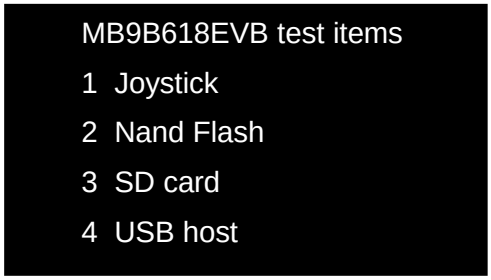

Figure 2-2: start-up message of the EVB

The message indicates that the UART can receive data successfully and the test can be continued.

2.2 Joystick

- Input "**1**" into the sending out area of the serial tool and then press the button "手动发送" to send command to the EVB
- The message of " **joystick testing, press enter key to exit** " will be shown in the tool as figure 2-3
- The corresponding name of the key will be shown on the tool when it is pressed
- Press the middle key " **enter** " to exit the testing of joystick
- The message of " **exit joystick test** " will be shown thereafter

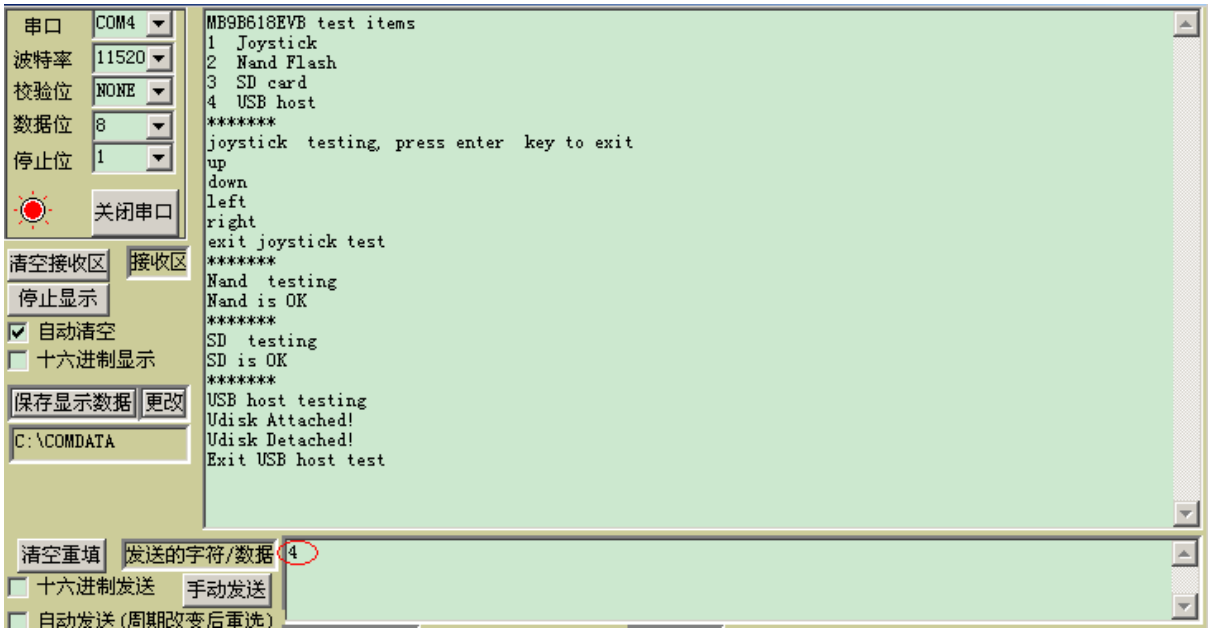

Figure 2-3: testing screen

2.3 Nand flash

- Input " **2** " into the same tool and press " 手动发送 " button to send it out
- The message of " **Nand testing** " will be shown
- The message of " **Nand is OK** " will be shown if the Nand flash works well
- The message of " **Nand Error**" will be shown if error presents in the connection between Nand flash and MCU.

2.4 Micro SD

- Input " **3** " into the same tool and press " 手动发送 " button to send it out
- The message of " **SD testing** " will be shown
- The message of " **SD is OK** " will be shown if the SD works well
- The message of " **SD Error** " will be shown if SD is not plugged

2.5 USB host

- Input " **4** " into the same tool and press " 手动发送 " button to send it out

- Plug flash disk into the EVB. The message of ” **Udisk Attached!** ” will be shown when the flash disk is recognized by the USB host dirver
- The message of ” **Udisk Detached!** ” will be shown when the flash disk is unplugged
- The message of ” **Exit USB host test**” will be shown when pressing the “enter ” key to exit the testing of USB host

2.6 Ethernet

- Set the IP address of PC as shown below:

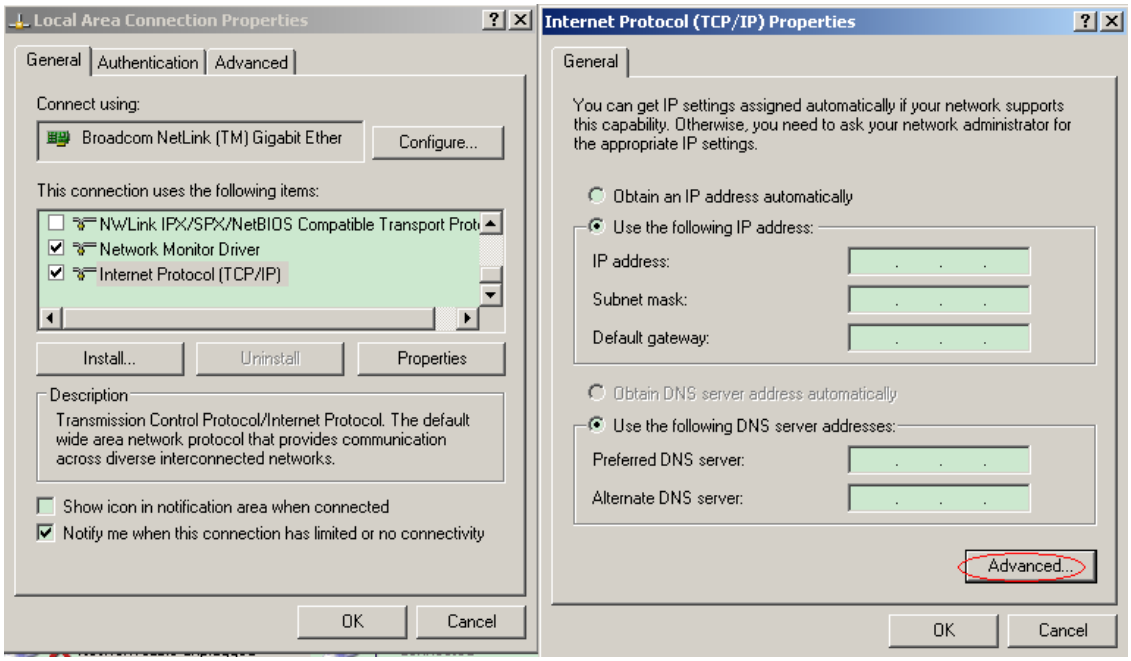
Local Area Connection Properties
General
Authentication
Advanced
Connect using:
Broadcom NetLink (TM) Gigabit Ether
Configure...
This connection uses the following items:
NWLink IPX/SPX/NetBIOS Compatible Transport Prot
Network Monitor Driver
Internet Protocol (TCP/IP)
Install...
Uninstall
Properties
Description
Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.
Show icon in notification area when connected
Notify me when this connection has limited or no connectivity
OK
Cancel
Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Subnet mask:
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Figure 2-4: IP address setting of PC

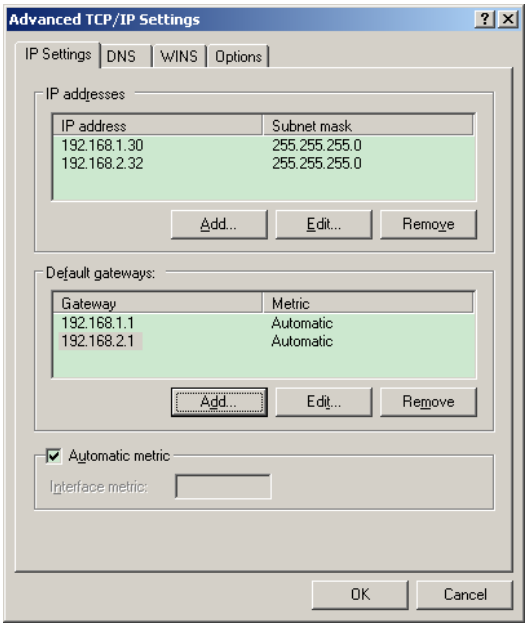

Figure 2-5: IP address of PC after configured

- Short JP11.Connect the PC and Ethernet Port 0 (J1) with an Ethernet cable
- The green light of the Ethernet port should be illuminated when EVB powers on

- Ping testing---Send command of “**ping 192.168.1.20** “ per CMD.exe tool of PC
- The screen below should be shown when the Port 0 is connected and works well

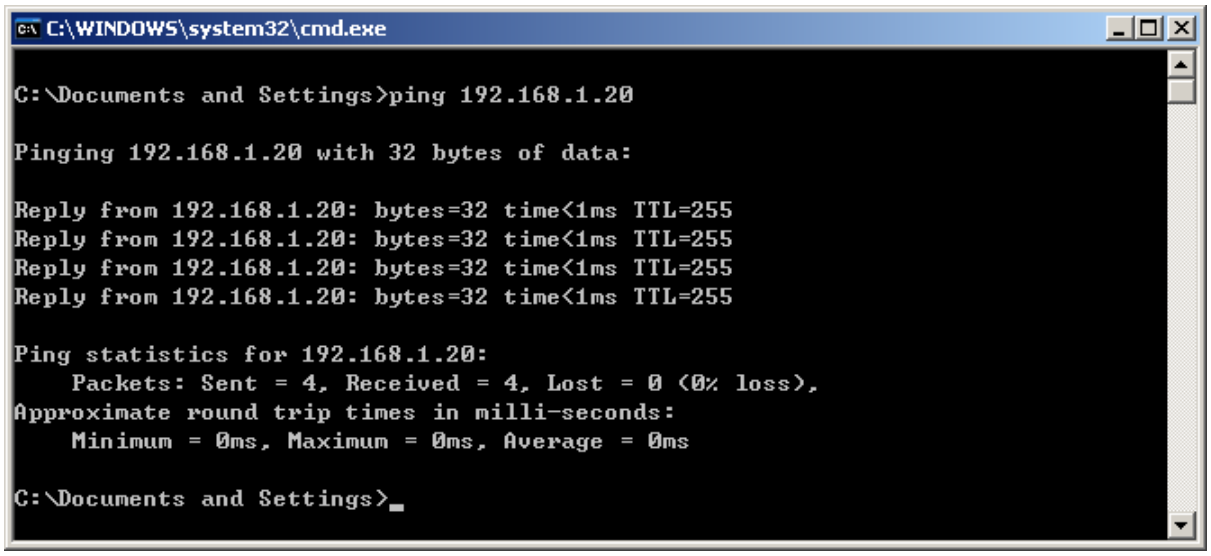
C:\WINDOWS\system32\cmd.exe
C:\Documents and Settings>ping 192.168.1.20
Pinging 192.168.1.20 with 32 bytes of data:
Reply from 192.168.1.20: bytes=32 time<1ms TTL=255
Reply from 192.168.1.20: bytes=32 time<1ms TTL=255
Reply from 192.168.1.20: bytes=32 time<1ms TTL=255
Reply from 192.168.1.20: bytes=32 time<1ms TTL=255
Ping statistics for 192.168.1.20:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\Documents and Settings>

Figure 2-6: Ethernet Port0 testing

- Connect the PC and the Ethernet Port 1 (J2) with an Ethernet cable.
- Ping testing---Send command of “**ping 192.168.2.22** “ per CMD.exe tool of PC
- The screen below should be shown when the Port 1 is connected and works well

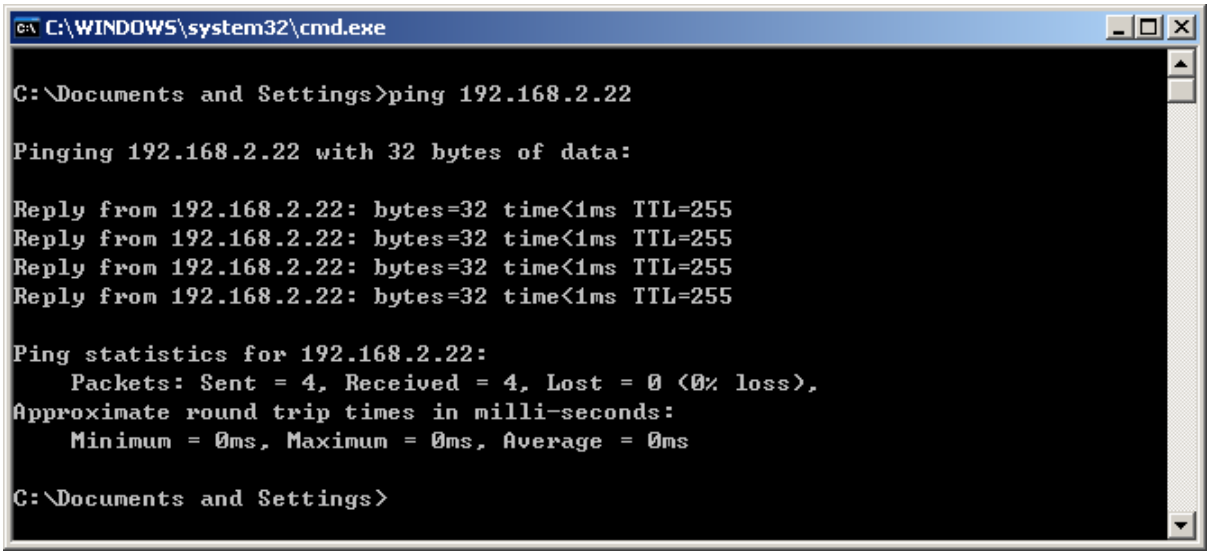
C:\WINDOWS\system32\cmd.exe
C:\Documents and Settings>ping 192.168.2.22
Pinging 192.168.2.22 with 32 bytes of data:
Reply from 192.168.2.22: bytes=32 time<1ms TTL=255
Reply from 192.168.2.22: bytes=32 time<1ms TTL=255
Reply from 192.168.2.22: bytes=32 time<1ms TTL=255
Reply from 192.168.2.22: bytes=32 time<1ms TTL=255
Ping statistics for 192.168.2.22:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\Documents and Settings>

Figure 2-7: Ethernet Port1 testing

3 Hardware Setting

3.1 Connectors Overview

Connector	Funcion	Setting
JP5~JP7	Power selection	Short JP5: power by USB Short JP6: power by JTAG Short JP7: power by external power supply
MD0	Mode setting	Short: Programming mode, JP9 should be shorted also Open: Normal mode
JP9	USB programming	Work with MD0 to update the internal Flash of MCU
JP10,JP11	PHY reference clock selection	Short JP10: 50Mhz provided by MCU Short JP11: 50Mhz provided by external oscillator
J9,J20,J21	Testing / extenstion pins	

Table 3-1: Connector List

Attention:

1) Never short JP5-JP7 at the same time! When Keil U-Link ME is used, power supply by JTAG is not supported.

2) Never short JP10 and JP11 at the same time, which will cause abnormity of the MCU!

3.2 Setting for USB On-Board Programming

Connector	Function	Setting
MD0	Mode setting	short
JP9	USB programming	short

Table 3-2: Setting for USB On-Board Programming

3.3 Setting for Debug Tool

■ Using IAR J-Link

Connector	Function	Setting
J14	JTAG connector	Connected with J-Link
JP5~JP7	Power selection	Short JP5: power by USB Short JP6: power by JTAG Short JP7: power by external power supply
MD0	Mode setting	Open

Table 3-3: Setting for J-Link

■ Using Keil U-Link ME

Connector	Function	Setting
J14	JTAG connector	Connected with J-Link
JP5,JP7	Power selection	Short JP5: power by USB Short JP7: power by external power supply
MD0	Mode setting	Open

Table 3-4: Setting for U-Link Me

4 Flash On-Board Programming

4.1 On-Board Programming via USB

- Check the connector setting as described in section 3.2.
- When connecting with PC via USB cable, the EVB can be identified as a USB device after power on.

Figure 4-1: USB Device Sign

- Check the COM port for this USB device in the device manager.

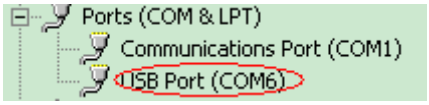

Figure 4-2: COM Port in Device Manager

- Install the USB programmer: usbdirect-v01l05.zip. (It can be downloaded from the web)
- Run the software and set the parameter as shown in following figures, and select Hex file. Click "**Full Operation**" button.

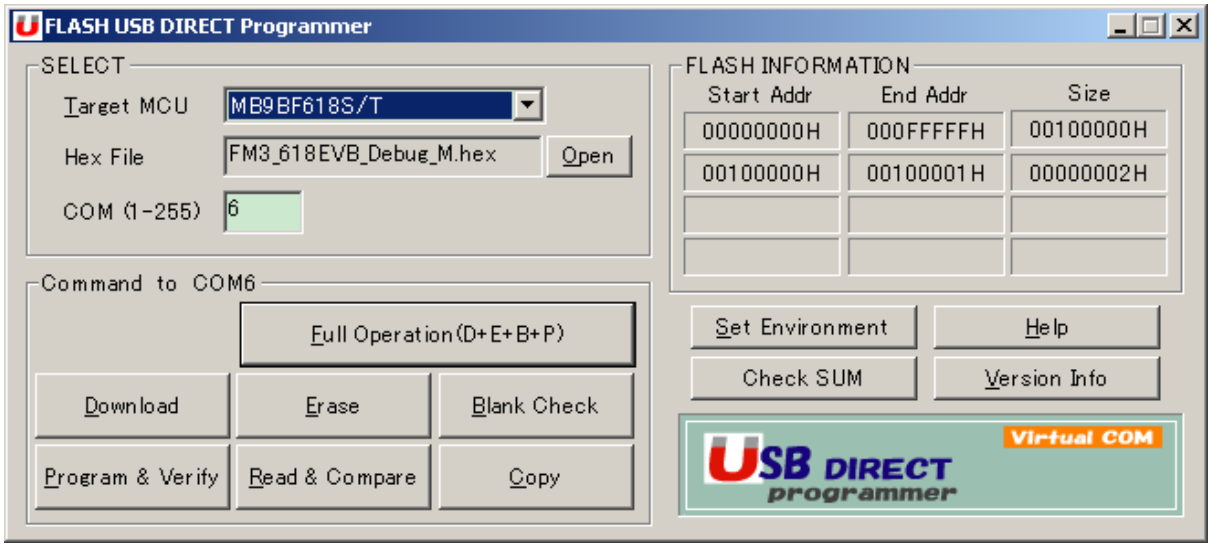

Figure 4-3: Setting of USB Programmer

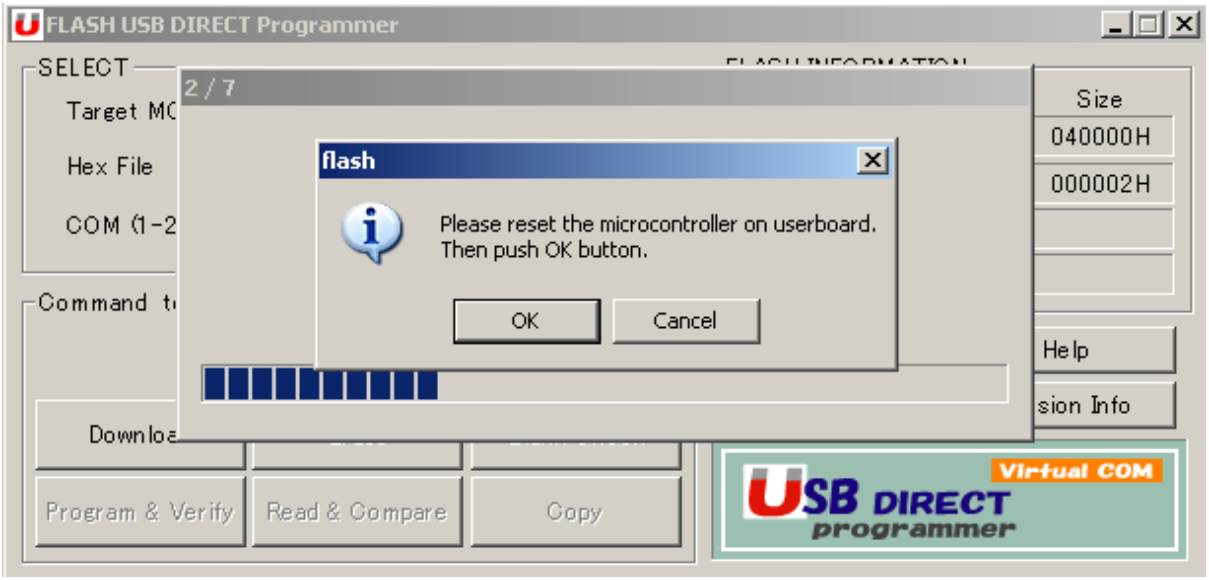

Figure 4-4: Reset the EVB message during programming

- Reset the EVB and click the “OK” button to start programming.

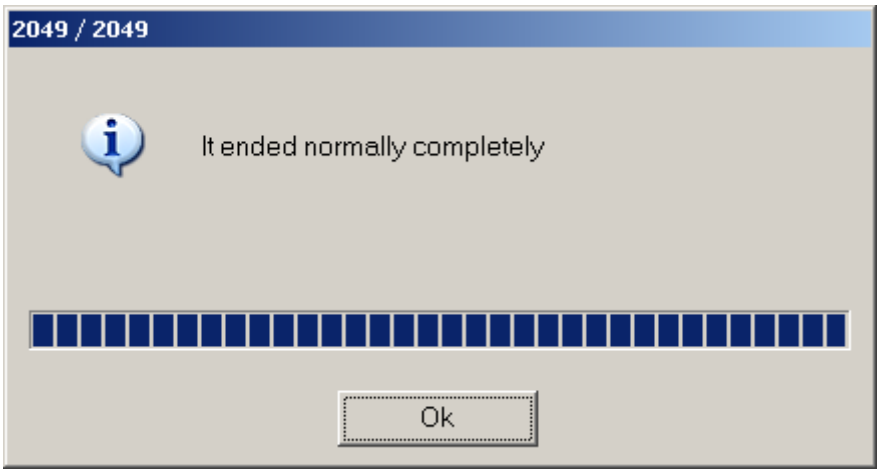

Figure 4-5: Programming complete successfully

5 Sample Code

The following sample projects are provided for FSSDC-9B618-EVB. Please check the update of the website for more samples.

Project Name	Description
618EVB_sample	Developed using IAR IDE, the simple demo of accessing the peripherals on the EVB is provided, such as USB host, UART, Micro SD, Nand flash, Joystick and Led.
618EVB_ethernet	Developed using IAR IDE, uC/OS-II and an open source TCP/IP stack—LwIP are adopted to demonstrate the Ethernet features of the MB9BF618S. Some sample applications are provided, i.e. UDP/TCP server & Web server.
mb9bf618s_template	The project template for IDE of IAR and Keil.

Notes:

1) **More details for the Ethernet demo projects can be found in another user manual with PN: MCU-AN-510042-E-10.**
2) **The source code of uC/OS-II kernel should be downloaded from the web below and copied to folder of : middleware\uCOS_II_V286\Source**
   http://micrium.com/page/downloads/source_code

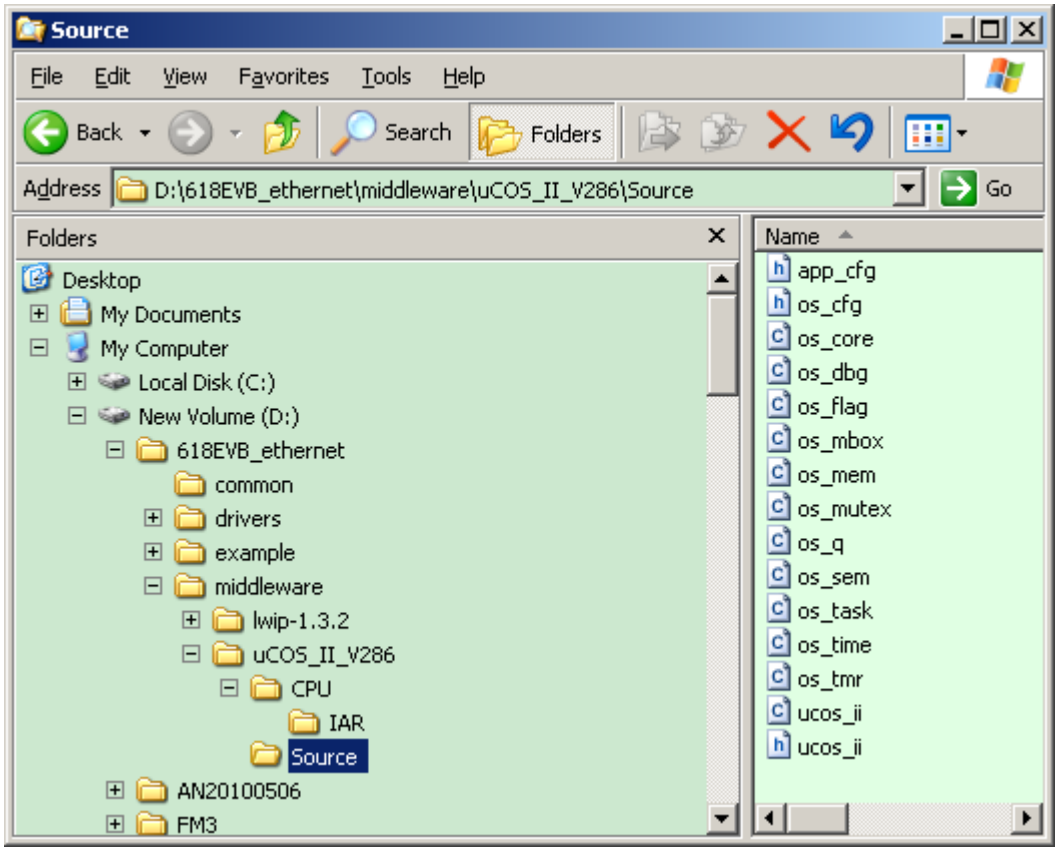

Figure 5-1: Structure of the Project folder

3) IAR IDE version is EWARM V6.21 and Keil IDE version is uVision 4.21.

4) If using other version IDE to debug these projects, compiling error may occur. Then please kindly check the following settings.

- IAR IDE
  - MCU type
  - Pre-included file
  - ICF file
  - Flash loader

- Keil IDE
  - MCU type
  - Pre-included file
  - ROM & RAM memory address

6 Debug Tool and IDE

FSSDC-9B618-EVB supports both Keil U-Link-ME and IAR J-Link for debugging.

Figure 6-1: J-Link Overview

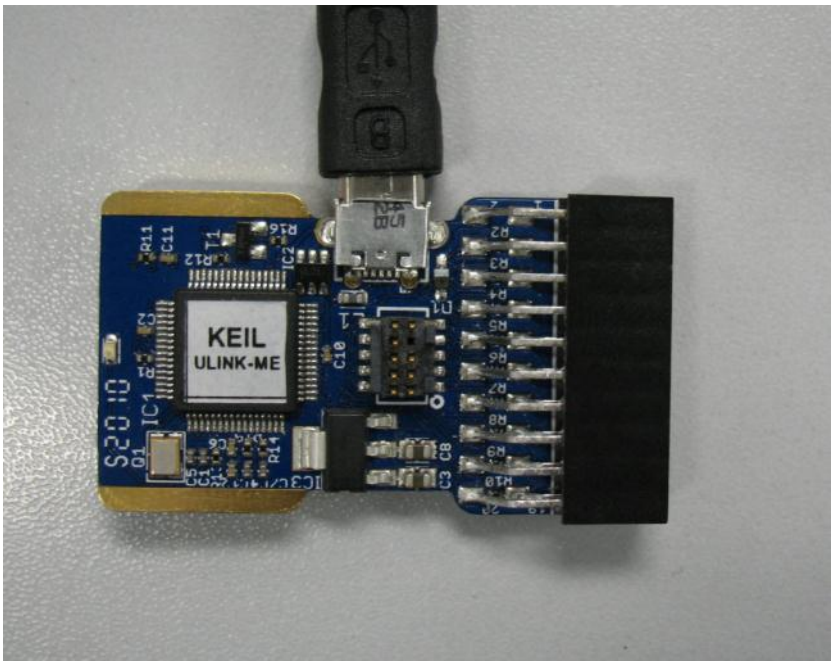

Figure 6-2: U-Link Me Overview

The U-Link-me should be used with Keil uVision 4 which can be downloaded freely from following website.

https://www.keil.com/update/sw/RVMDK/4.21

The J-Link should be used with IAR Embedded Workbench which can be downloaded freely from following website.

http://www.iar.com/website1/1.0.1.0/68/1/

The introduction of using the IDE can be found in the document whose PN is MCU-AN-510014-C-10.

7 Materials to Download

The following materials can be downloaded from the website,
http://www.fujitsu.com/cn/fss/mcu/32bit/fm3/

- **Software**
  - FUJITSU Flash USB DIRECT Programmer

- **Document**
  - FSSDC-9B618-EVB User Manual
  - FSSDC-9B618-EVB Schematic
  - MB9B610 Series Datasheet
  - MB9B610 Series Peripheral Manual
  - MB9B610 Series Flash Programming Manual

- **Sample code**
  - 618EVB_sample
  - 618EVB_ethernet
  - mb9bf618s_template

- **IDE Study Material**
  - IAR IDE study material
  - Keil IDE study material